

Appl. No. 10/827,097
Reply to Office action of May 18, 2005/Submission

REMARKS

Claims 1, 9, 12, 27, 31, 32, 34-40, and 45-53 are pending. Reexamination and reconsideration in view of the following remarks are respectfully requested.

Claim Rejections – 35 U.S.C. § 103

In the prior action, claims 36, 37, and 46 were allowed. Claims 1, 9, 12, 27, 31, 32, 34, 35, 38-40, 45, and 47-53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over a combination of several references. In particular, claims 1, 9, 12, 27, 31, 34, 35, 39, 40, 48, and 50-53 were rejected as being obvious in view of U.S. Patent No. 6,616,355 (the “’355 patent”), U.S. Patent No. 6,457,823 (the “’823 patent”), and an article entitled “New Cold-Cure High-Performance UV Systems,” authored by P. Jackson (the “Jackson reference”). The remaining claims were rejected as being unpatentable in view of a combination of the ’355 patent, the ’823 patent, and other references. In short, the ’355 and ’823 patents form the basis of all the rejections made by the Office.

In the present action, the Office asserts, that the ’355 patent discloses a printer with a substrate support, an ink jet print head, moving a print head carriage, jetting ink from heads, and a vacuum source. The Office admits, however, that the ’355 patent does not disclose a “UV curing head on the carriage sufficiently close to the ink jet print head and the UV curing head being configured to emit sufficient UV energy to cure the ink jetted onto the substrate, at least partially cure, a substrate formed of such material.”

According to the Office (with citation to the Abstract), the ’823 patent discloses “at least one UV curing head on the carriage sufficiently close to the ink jet print head and the UV curing head being configured to emit sufficient UV energy to cure the ink jetted onto the substrate, at least partially cure, a substrate formed on such material.”

The Office continues by stating that the ’355 patent does not teach a print head track that extends “parallel to the plane having a print head carriage moveable, while [the ’823 patent] teaches print heads (17) are transversely moveable across the frame (16) and may be moveable on the frame under the power of transverse drive (31).” However, the Office asserts that “it would have been obvious to one having skill in the art to have a print head track in order to move the print head.”

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The Office also asserts that the controller disclosed in the '823 patent is operable to "activate the UV curing head and the UV curing head is moveable to the plane and maintain focus of UV light from the [print head] on ink jetted onto the surface of the substrate." The Office admits that "Cleary fails to teach cold UV curing head and cold UV includes a limited bandwidth UV source, a reflector and a fluid cooling system and power consumption of at least 200 watts per linear inch." The Office asserts that the Jackson reference teaches using cold UV to "cure ink, the substrate have to deform as it move in direction of print head and since the combination teach the UV cold, the same UV light would achieve the same effect such as to freeze the ink on the surface of the substrate without impinging radiation that would materially deform the substrate." The Office concludes that it would have been obvious to one of ordinary skill in the art to use cold UV as taught by Jackson to "improve product quality."

Applicant's Response

With all due respect, Applicant asserts that the Office has misconstrued the references. When properly construed the references do not teach or suggest the claimed subject matter. In addition, the Office has failed to identify any proper motivation to combine them.

The '355 patent is completely silent on the placement of UV lamps on a printhead carriage or problems associated with curing UV ink. The '355 patent mentions "solvent pigment inks, UV resistant inks, or water inks," col. 6, line 7, none of which are UV curable inks. Instead of relating to problems with UV curable inks, the '355 patent is directed to sensing the thickness of a substrate and adjusting the distance between a substrate and a printhead. This is done so that the printer can handle different types of substrates which are likely to have different thicknesses. The adjustment in printhead-to-substrate distance is based on a measurement made by thickness roller 20 at a point that is prior to the substrate reaching the printhead (see Figs. 1 and 2A). There is no discussion whatsoever about a change in substrate thickness that might occur due to thermal deformation.

The '823 patent discloses the placement of UV lamps on a printhead carriage (col. 3, lines 59-66 of the '823 patent), but never mentions the use of cold UV lamps. Rather, the '823 patent is directed to a system that reduces the amount of UV radiation to 5% of what is needed to fully cure UV ink and to solving energy consumption and speed problems. For example, in the Summary, the '823 patent states the following:

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During the printing process, UV curable ink must be cured within a short time period after it has been deposited on the substrate, otherwise ink with positive dot gain may spread out and flow away, or ink with negative dot gain may ball up and roll away. UV radiation sources mounted on the carriage are capable of emitting radiation at high enough energies to cure the ink within such time frames.

However, a significant amount of power must be supplied to the UV radiation source to enable it to emit these high energies. Typical UV radiation sources are quite inefficient since most of the emitted radiation is unusable. In fact, upwards of 95% of the emitted radiation is not used because the source emits radiation with wavelengths over a spectrum which is much wider than the usable spectrum. In addition, to ensure that the required amount of radiation is transmitted to the ink, the carriage must scan across the substrate at moderate speeds, even though the print heads are capable of depositing ink onto the substrate at much higher carriage speeds.

It is desirable, therefore, to set (i.e.,) pre-cure) the ink rather than fully cure it as the ink is deposited on the substrate so that the ink does not spread or ball up, even though it is still in a quasi-fluid state (i.e.,) the ink is not completely hardened). The energy required to set the ink is typically about 5% of the energy necessary to cure the ink. Such an arrangement requires less power, and, therefore, facilitates using smaller UV radiation sources. In addition, a lower energy output requirement would allow the carriage to operate at a higher speed. Hence, images can be printed at a higher rate, resulting in a higher throughput.

Col. 1, lines 32-60 (emphasis added).

Rather than rendering the claimed subject matter obvious, the '823 patent teaches against "substantially curing" UV ink using a "cold UV" source as required, for example, by pending claim 1. As noted, the '823 patent teaches the use of low-power UV lamps to reduce energy consumption. The '823 patent also teaches a two-stage curing process that involves first "setting" the ink and then fully curing the ink. For example, col. 6, lines 48-54, of the '823 patent states that "the radiation sources 42 . . . transmit energy to the ink deposited onto the substrate to set and fix the ink in place. Subsequently, that portion of the substrate moves to curing station 200. The UV-curing source 206 then emits a sufficient amount of [UV energy] to fully cure the ink." Therefore, despite whatever suggestions other references (such as the Jackson reference) might provide to mount cold UV lamps on a printhead carriage to cure UV ink, that is not what was done in the '823 patent. Instead, Cleary et al. went in an opposite

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direction – reduced output lamps and a two-step process. Thus, there is no teaching or suggestion to use “cold UV” to “substantially cure” as is claimed, for example, in claim 1.

The Examiner's statement that the '823 patent teaches cold UV lamps appears to be based on an assumption that limited bandwidth or low output is the same as cold UV. First, “low output” is not necessarily the same as cold. Cold UV reduces the amount of thermal energy impinged on a substrate. However, as claimed in claim 1, for example, the output of the lamp is sufficiently high to substantially cure ink. This is not the same as a low output lamp used to set ink, which according to the '823 patent uses about 5% of the energy needed to cure ink. Second, with respect to limited bandwidth, it is possible that a limited bandwidth source could be a cold UV source. However, there is no recognition in the '823 patent that any of the lamps disclosed reduce heat that is impinged on a substrate. More importantly, none of the sources on the print head are configured to substantially cure the ink. As noted, fully curing with a UV lamp on the print head would be antithetical to the teachings in '823 patent, which focus on configuring the lamps on the print head only to set the ink. Using a cold UV lamp to substantially cure would destroy the fundamental rationale of reducing energy usage, which is stressed in the '823 patent. Thus, even if certain lamps disclosed in the '823 can be categorized as cold UV lamps, none are recognized or used for the purposes of limiting the amount of heat impinged on a substrate or to substantially cure ink.

Another related reason why the '823 patent teaches away from the use of cold UV lamps is that such lamps (at least in many common forms) are inherently energy inefficient. The '823 patent emphasizes energy efficiency. Most cold UV systems are inefficient in that much of the radiation emitted by the bulb itself is not useful for UV curing and is filtered out. Further, many cold UV systems require some kind of cooling system (such as a water or air system) which requires energy to operate. Thus, if energy efficiency is important, cold UV (in common forms) would not be a logical choice. Thus, the Office's proposed combination would require that one of ordinary skill in the art ignore the fundamental premises of the '823 patent with respect to reducing energy usage.

For all the reasons noted above, the proposed combination does not teach or suggest the claimed subject matter. Instead, when the references are properly construed it is clear that they teach away from the claimed subject matter.

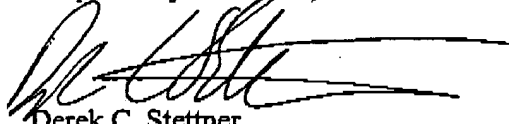
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Regarding the proposed motivation to combine the references, the Office asserts that one of ordinary skill would be motivated to combine the references in order to "improve product quality." Yet, a sweeping and general motivation such as "improving quality" could be applied to almost any situation as almost no rational person enjoys things that are of "poorer quality." Thus, the Office provides no legitimate motivation for combining the references.

The rejections raised against other claims are believed to be moot in view of the foregoing. Therefore, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant asks the Examiner to telephone the attorneys of record in the event a telephone discussion would be helpful in advancing the prosecution of the present application. Further, as noted above, Applicant requests the courtesy of an interview before the Office issues a first action in this case. Applicant reserves the right to supplement this filing with additional arguments and evidence.

Respectfully submitted,



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